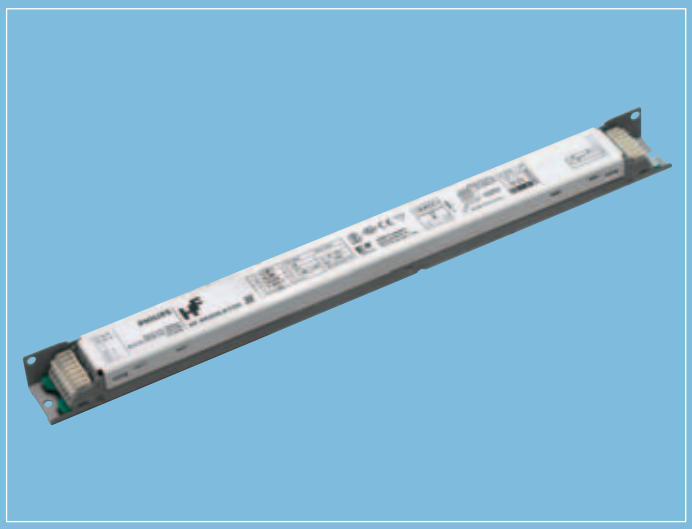
Fluorescent electronic

(Additional to Chapter 3.12 catalogue 2005/2006)

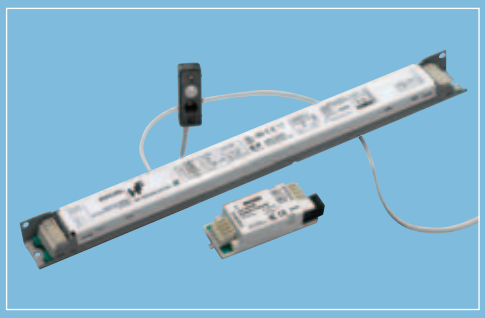


HF-REGULATORII (Touch and DALI)

Touch and Dim

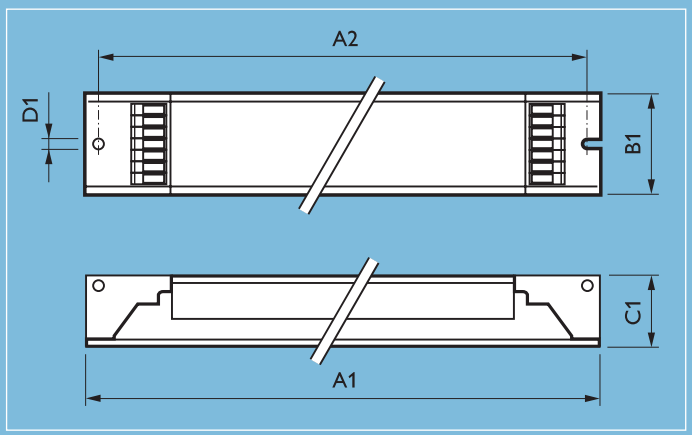
DALI

EII TECHNOLOGY



HF-REGULATORII is used in ActiLume systems for automatic light control

Dimensions in mm



Product description

Flat, lightweight high-frequency electronic regulating ballast, using DALI (Digital Addressable Lighting Interface) or Touch and Dim push button protocol, for TL5 fluorescent lamps. The HF-REGULATOR*II* ballasts incorporate the new Philips E*II* technology offering full digital input (mains) and output (lamp) management.

Features and benefits

- The lamp power can be regulated from 100% to 1%.
- Flat ballast design, 21 mm high.
- Up to 75% reduction in energy consumption can be achieved by using automatic lighting control systems (e.g. Philips ActiLume luminaire-based system solutions).
- Quick programmed start: 0.5 sec, flicker-free warm start, preheating the lamp electrodes. This enables the lamps to be switched on and off without reducing useful life. Ideal for areas with a high switching frequency.
- Digital control input according to the industry standard DALI (Digital Addressable Lighting Interface) combined with the Touch and Dim push button protocol.
- Low energy consumption in standby 0.35W due to the new E*II* technology.
- Increased lamp wire flexibility thanks to the Parasitic Capacitance Compensation (longer lamp wiring possible up to 2 meter).
- Smart power: constant light, independent of mains voltage fluctuations.
- Unit is protected against excessive mains voltages incorrect connections and incorrect lamp use.
- Striation-free operation, no stroboscopic effects.
- Lamp starts at 1% (DALI 1...100% in 100 ms).
- Automatic stop circuit is activated within five seconds in case of lamp failure (safety stop). Once the lamp has been replaced, the ballast resets automatically.
- Equipped with connectors suitable for automatic wiring machines.

The Philips HF-REGULATOR*II* electronic ballasts are equipped with E*II*-dim technology. This is a dedicated integrated circuit that ensures independent control of each electrode and, in doing so, takes care that:

a. lamp life is unaffected by dimming position
b. lamp burning is stable in every dimming position; and
c. energy savings, when dimming are maximised.

Applications

Typical areas of application include:

- DALI installations with daylight linking and/or movement detection (for energy savings)
- DALI installations with remote control systems (combining energy savings with comfort)
- Installations with emergency back-up, according to IEC 60598-2-22/VDE 0108.
- Office applications were a simple and easy to install dimming system or personal light level adjustment is required.

	A1	A2	B1	C1	D1
1 Lamp	360	350	30	21	4.2
2 Lamps	360	350	30	21	4.2
2x80W	425	415	30	21	4.2
3/4 Lamps	360	350	39	21	4.2

Dimensions in mm

Examples
- Office buildings: insurance companies, banks, government ministries
  - Cellular or open plan offices
  - Conference rooms, lecture theatres, corridors
- Schools
- Hospitals
- Department stores, shops, supermarkets
- Hotels, restaurants and bars
- Cinemas, museums.

Philips quality
This applies optimum quality with respect to:
- System supplier
  As manufacturer of lamps, electronic control gear and lighting control equipment, Philips ensures that, from the earliest development stage, optimum performance is maintained.
- International standards
  Philips HF electronic regulating ballasts comply with all relevant international rules and regulations.

Compliances and approvals
- RFI<30 MHz: EN 55015
- RFI>30 MHz: EN 55022 limit B
- Harmonics: EN 61000-3-2
- Immunity: EN 61547
- Safety: EN 61347-2-3
- Performance: EN 60929
- Vibration & bump tests: EN 60068-2-6-FC
  EN 60068-2-29-Eb
- Quality standard: ISO 9001
- Environmental standard: ISO 14001
- Approval marks: ENEC
  EMV-VDE
- Temp. declared thermally protected: EN 61347-1 110

- CE marking

Technical data for installation

Mains operation	
Rated mains voltage	220-240 V
With tolerances for safety: +/- 10%	198-264 V
Tolerances for performance +6%-8%	202-254 V
Mains frequency	50/60 Hz
Smart power: with AC mains voltage fluctuations, luminous flux varies by ± 2% max.	202-254 V
DC voltage operation (during emergency back-up)	
Required battery voltage for guaranteed ignition	198V – 254 V
Required battery voltage for burning lamps	176V – 254 V
Nominal light output is obtained at a voltage of	220V – 240 V

Notes:
1. For continuous DC application, an external fuse should be used in the luminaire.
2. Continuous low DC voltages (<198 V) can influence the lifetime of the ballast.
3. For the HF-R TD 280 TL5/PL-L lamp EII power will be limited to 50% of the nominal lamp power when operating on DC.

Earth leakage current	< 0.5 mA per ballast
Maximum number of ballasts which can be connected to one Residual Current Detector of 30 mA	30
Overvoltage protection	48 hrs at 320 V AC 2 hrs at 350 V AC
Automatic restart after lamp replacement or voltage dip	Yes

Mains current at 230V

Ballast	Lamp type	Qty of Lamps	Input current A
HF-R TD 114-35 TL5 EII	TL5 14 W HE	1	0.09
HF-R TD 214-35 TL5 EII	TL5 14 W HE	2	0.15
HF-R TD 314 TL5 EII	TL5 14 W HE	3	-
HF-R TD 414 TL5 EII	TL5 14 W HE	4	-
HF-R TD 114-35 TL5 EII	TL5 21 W HE	1	0.12
HF-R TD 214-35 TL5 EII	TL5 21 W HE	2	0.23
HF-R TD 114-35 TL5 EII	TL5 28 W HE	1	0.14
HF-R TD 214-35 TL5 EII	TL5 28 W HE	2	0.27
HF-R TD 114-35 TL5 EII	TL5 35 W HE	1	0.17
HF-R TD 214-35 TL5 EII	TL5 35 W HE	2	0.34
HF-R TD 124 TL5 EII	TL5 24 W HO	1	-
HF-R TD 224 TL5 EII	TL5 24 W HO	2	-
HF-R TD 324 TL5 EII	TL5 24 W HO	3	-
HF-R TD 424 TL5 EII	TL5 24 W HO	4	-
HF-R TD 139 TL5 EII	TL5 39 W HO	1	-
HF-R TD 239 TL5 EII	TL5 39 W HO	2	-
HF-R TD 149 TL5 EII	TL5 49 W HO	1	0.24
HF-R TD 249 TL5 EII	TL5 49 W HO	2	0.45
HF-R TD 154 TL5 EII	TL5 54 W HO	1	0.26
HF-R TD 254 TL5 EII	TL5 54 W HO	2	0.52
HF-R TD 180 TL5/PL-L EII	TL5 80 W HO	1	0.38
HF-R TD 280 TL5/PL-L EII	TL5 80 W HO	2	0.75

Inrush current

Ballast	Qty of Lamps	Max. quantity of ballasts per Miniature Circuit Breaker Type B16 A	Inrush current 1/2 value time at typical mains impedance
HF-R TD 114-35 TL5 EII	1x14	28	27A/300 µS
HF-R TD 214-35 TL5 EII	2x14	12	45A/400 µS
HF-R TD 314 TL5 EII	3x14	-	-
HF-R TD 414 TL5 EII	4x14	-	-
HF-R TD 114-35 TL5 EII	1x21	28	27A/300 µS
HF-R TD 214-35 TL5 EII	2x21	12	45A/400 µS
HF-R TD 114-35 TL5 EII	1x28	28	27A/300 µS
HF-R TD 214-35 TL5 EII	2x28	12	45A/400 µS
HF-R TD 114-35 TL5 EII	1x35	28	27A/300 µS
HF-R TD 214-35 TL5 EII	2x35	12	45A/400 µS
HF-R TD 124 TL5 EII	1	-	-
HF-R TD 224 TL5 EII	2	-	-
HF-R TD 324 TL5 EII	3	-	-
HF-R TD 424 TL5 EII	4	-	-
HF-R TD 139 TL5 EII	1	-	-
HF-R TD 239 TL5 EII	2	-	-
HF-R TD 149 TL5 EII	1	28	19A/220 µS
HF-R TD 249 TL5 EII	2	12	32A/300 µS
HF-R TD 154 TL5 EII	1	28	24A/250 µS
HF-R TD 254 TL5 EII	2	12	45A/400 µS
HF-R TD 180 TL5/PL-L EII	1	12	45A/400 µS
HF-R TD 280 TL5/PL-L EII	2	9	35A/350 µS

Conversion table for max. quantities of ballasts on other types of Miniature Circuit Breakers

MCB Type		Relative quantity of ballasts
B	16A	100%(see table on the left)
B	10A	63%
C	16A	170%
C	10A	104%
L, I	16A	108%
L, I	10A	65%
G, U, II	16A	212%
G, U, II	10A	127%
K, III	16A	254%
K, III	10A	154%

Insulation resistance test	500 V DC from Line/Neutral to Earth (not between Line and Neutral) Note: Ensure that the Neutral is reconnected again after the above mentioned test is carried out and before the installation is put into operation.
TL5 lamp wiring	500 V rated components and wiring are required with HF-REGULATOR// TL5.
Ignition time	Typical 0.5 sec. quick warm start.

Technical data (all typical values at Vmains =230 V)

Lamps	Qty of Lamps	Ballast	System Power* W	Lamp Power* W	Ballast Loss* W	Efficacy at 35 °C** lm/W	Lumen* lm	CELMA Nom.* EEI
TL5 HE 14W	1	HF-R TD 114-35 TL5 EII	18	14	4	96	1200	A1
TL5 HE 14W	2	HF-R TD 214-35 TL5 EII	34	28	6	96	2400	A1
TL5 HE 14W	3	HF-R TD 314 TL5 EII	-	-	-	-	3600	A1
TL5 HE 14W	4	HF-R TD 414 TL5 EII	-	-	-	-	4800	A1
TL5 HE 21W	1	HF-R TD 114-35 TL5 EII	25	22	3	100	1900	A1
TL5 HE 21W	2	HF-R TD 214-35 TL5 EII	50	44	6	100	3800	A1
TL5 HE 28W	1	HF-R TD 114-35 TL5 EII	32	28	4	104	2600	A1
TL5 HE 28W	2	HF-R TD 214-35 TL5 EII	61	56	6	104	5200	A1
TL5 HE 35W	1	HF-R TD 114-35 TL5 EII	38	35	4	104	3300	A1
TL5 HE 35W	2	HF-R TD 214-35 TL5 EII	77	70	7	104	6600	A1
TL5 HO 24W	1	HF-R TD 124 TL5 EII	-	-	-	-	2000	A1
TL5 HO 24W	2	HF-R TD 224 TL5 EII	-	-	-	-	4000	A1
TL5 HO 24W	3	HF-R TD 324 TL5 EII	-	-	-	-	6000	A1
TL5 HO 24W	4	HF-R TD 424 TL5 EII	-	-	-	-	8000	A1
TL5 HO 39W	1	HF-R TD 139 TL5 EII	-	-	-	-	3500	A1
TL5 HO 39W	2	HF-R TD 239 TL5 EII	-	-	-	-	7000	A1
TL5 HO 49W	1	HF-R TD 149 TL5 EII	54	49	5	99	4300	A1
TL5 HO 49W	2	HF-R TD 249 TL5 EII	106	98	8	99	8600	A1
TL5 HO 54W	1	HF-R TD 154 TL5 EII	60	54	6	93	4450	A1
TL5 HO 54W	2	HF-R TD 254 TL5 EII	119	108	11	93	8900	A1
TL5 HO 80W	1	HF-R TD 180 TL5/PL-L EII	87	80	7	88	6150	A1
TL5 HO 80W	2	HF-R TD 280 TL5/PL-L EII	174	162	12	88	12300	A1

* Typical values for /830 measured at 100% power and 25 °C lamp ambient temperature
** Typical values at 35 °C (light top for MASTER TL5 Super 80 lamps)

Lamp	Qty of Lamps	Ballast	Power Factor	Max cable Cap[1)] Lp-Lp/Lp-Lgnd PF	Tc max °C	Operating Frequency kHz
TL5 HE 14W	1	HF-R TD 114-35 TL5 EII	0.95	100/75	75	42..110
TL5 HE 14W	2	HF-R TD 214-35 TL5 EII	0.95	100/75	75	42..110
TL5 HE 14W	3	HF-R TD 314 TL5 EII	-	-	-	-
TL5 HE 14W	4	HF-R TD 414 TL5 EII	-	-	-	-
TL5 HE 21W	1	HF-R TD 114-35 TL5 EII	0.96	100/75	75	42..110
TL5 HE 21W	2	HF-R TD 214-35 TL5 EII	0.97	100/75	75	42..110
TL5 HE 28W	1	HF-R TD 114-35 TL5 EII	0.97	100/75	75	42..110
TL5 HE 28W	2	HF-R TD 214-35 TL5 EII	0.98	100/75	75	42..110
TL5 HE 35W	1	HF-R TD 114-35 TL5 EII	0.99	100/75	75	42..110
TL5 HE 35W	2	HF-R TD 214-35 TL5 EII	0.99	100/75	75	42..110
TL5 HO 24W	1	HF-R TD 124 TL5 EII	-	-	-	-
TL5 HO 24W	2	HF-R TD 224 TL5 EII	-	-	-	-
TL5 HO 24W	3	HF-R TD 324 TL5 EII	-	-	-	-
TL5 HO 24W	4	HF-R TD 424 TL5 EII	-	-	-	-
TL5 HO 39W	1	HF-R TD 139 TL5 EII	-	-	-	-
TL5 HO 39W	2	HF-R TD 239 TL5 EII	-	-	-	-
TL5 HO 49W	1	HF-R TD 149 TL5 EII	0.98	100/150	75	42..110
TL5 HO 49W	2	HF-R TD 249 TL5 EII	0.99	50/75	75	42..110
TL5 HO 54W	1	HF-R TD 154 TL5 EII	0.98	100/150	75	42..110
TL5 HO 54W	2	HF-R TD 254 TL5 EII	0.99	50/75	75	42..110
TL5 HO 80W	1	HF-R TD 180 TL5/PL-L EII	0.99	100/150	75	42..110
TL5 HO 80W	2	HF-R TD 280 TL5/PL-L EII	0.99	100/150	75	42..110

1) Lp-Lp = between lamp wires Typical wire capacitance 50 pF/m (spacing between wires 0.5 mm)
Lp-Lgnd = between lamp wires and ground Typical wire capacitance 72 pF/m (spacing between wires 0.5 mm)

Protected against accidental mains voltage connection: Yes

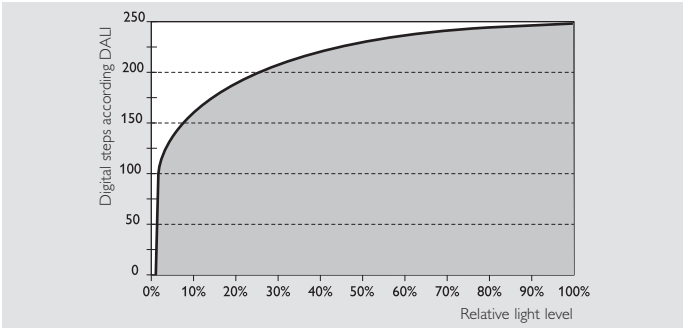
Control input

Regulating level (lamp power): 1 to 100%

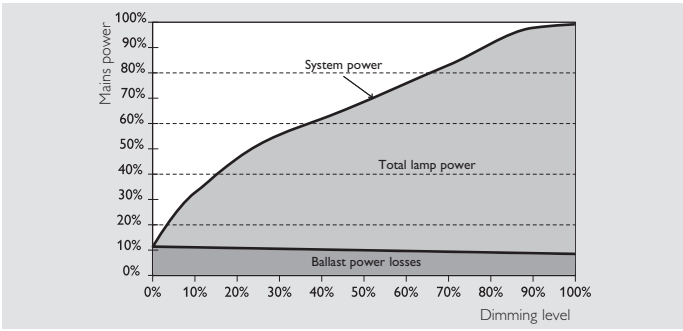
The control input complies with EN 60929 (Annex E) and is compatible with Philips lighting control equipment

Standby power consumption: < 350 mW

Control input insulation, basic insulation: ≥ 1500 V



Relation between lamp power and digital regulator



Input power vs dimlevel HF-REGULATORII (DALI/Touch and Dim)

Option 1) DALI
Digital coded input signal according to "Digital Addressable Lighting Interface" protocol, including 16 presets and 64 addresses possibility.

Option 2) Touch and Dim
A short push on the button represents the On/Off command.
Personal light levels can be stored in the internal memory by a firm longer push on the push button.
Failure proof (non volatile) memory ensures that the ballast always remembers your setting when next time switched on or in case of power failure.

Maximum number of ballasts connected in one circuit (switched on by one or multiple switches)	32 Pcs
Mains input signal	Retractive push-to-make switch
- Ignore status, <0.04 sec.	To avoid reaction on mains spikes!
- Short push, between 0.04 sec. and 0.5 sec.	Switch On/Off
- Long push, between 0.5 sec. and 10 sec.	Dim Up/Down
- Reset push, >10 sec.	Set light to mid value (35% output)

The dim function will toggle after each individual push. Except when the value is lower than 10% it will always dim up, and when the light output is higher than 70% it will always dim down to perform according human perception.

Technical data for design and mounting in fixtures

Temperatures	
Temperature range to ignite lamp	
With ignition aid	0 °C to +50 °C
at a 70..100% dim input	-20 °C to +50 °C
Storage temperature range	-25 °C to +80 °C
Stable lamp operation assured	> 15 °C*
Striation possible	< 10 °C

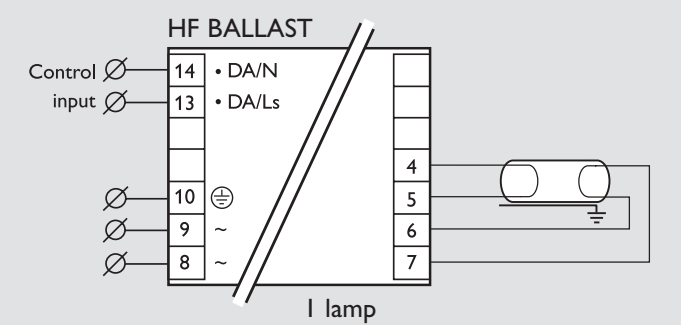
* >20 °C for HF-R TD 280 TL5/PL-L EII

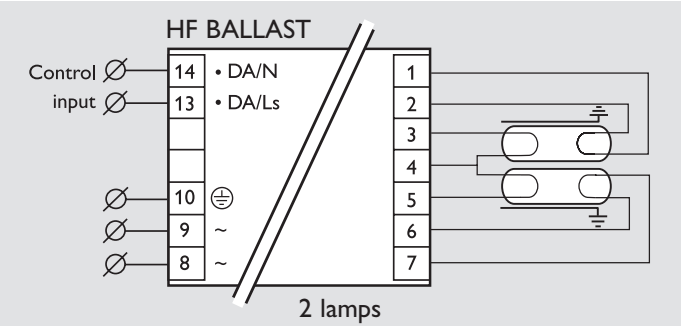
Max t case	75 °C

The lifetime of a ballast depends on the temperature of the ballast. This means there is a relation between the Tc point on the ballast and its lifetime. The HF-REGULATOR*II* ballast for TL5 applications has a specified lifetime of 50,000 hrs with a maximum of 10% failures guaranteed at a measured Tcase of 75 °C.
For more information regarding this subject consult the Philips Application guide for fluorescent lamp control gear.

Class II luminaires	This application is not advisable; only with extensive tests on luminaires can the correct operation be verified EMI precautions have to be taken
Outdoor	Ballast IP=23 In outdoor the luminaire has to be sufficiently IP rated Permitted humidity is tested according to EN 61347-1 par 11 Note that no moisture or condensation may enter the ballast
Ignition aid	For optimum ignition the TL5 lamps should be mounted at a maximum distance of 6 mm from a metal plate The metal plate should be electrically connected to the ballast housing
Earthing	Earthing of the HF ballast in a luminaire is necessary for EMC (electromagnetic compatibility)
Hum and noise level	Inaudible

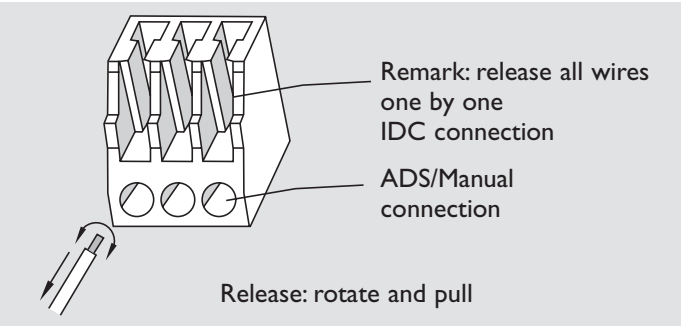
Wiring diagrams





Connector type

Connection wiring is greatly simplified through use of WAGO 251 universal connector. Suitable for both automatic wiring (ALF and ADS) and manual wiring.



Wire cross-section

IDC connection	0.5 mm - 1.0 mm^2
ADS manual connection *Stranded wire	0.5 mm – 0.75 mm^2*
Strip length	8.0 – 9.0 mm

Wiring tips

Earth connection to be made via housing or mains connector.
Wiring inside fixture should be straight and as short as possible. Lamp wires should not run parallel to mains or control wires to avoid EMC problems. For optimal performance, note that:

- For one lamp ballasts wires 4 and 5 as short as possible, equal in length and a minimum of 50 mm from mains or dim wires. Keep lamp wires 6 and 7 equal in length.
- For two lamp ballasts wires 3, 4 and 5 as short as possible, equal in length and a minimum of 50 mm from mains or dim wires. Keep lamp wires 6 and 7, and 1 and 2 equal in length.

Notes

1. Data based on a mains supply with an impedance of 400 mΩ (equal to 15 m cable of 2.5 mm^2 and another 20 m to the middle of the power distribution), under worst case conditions. With an impedance of 800 mΩ the number of ballasts can be increased by 10%.
2. Measurements will be verified in real installations, therefore data are subject to change.
3. In some cases the maximum number of ballasts is not determined by the MCB, but by the maximum electrical load of the lighting installation.
4. Note that the maximum number of ballasts is based on the assumption that these are all switched on at the same moment, i.e. by a wall switch.
5. Measurements were carried out on single-pole MCB's. For multi-pole MCB's it is recommended to reduce the number of ballasts by 20%.
6. First digital regulating steps (DALI) are fixed at 1% light output (dimming specification).
7. For optimum performance care has to be taken for symmetrical wiring. Minimal 6 mm distance from lamp to earth plane.
8. In case of DC operation the HF-R TD 280 TL5/PL-L EII will have maximum 40% light output

Ordering and packaging data

Ballast	1 Piece		Bulk packaging					
	EAN code	Weight	Qty	Dimensions lxwxh	Volume	Weight Gross	EAN code	EOC
		kg	pcs	cm	m³	kg		
HF-R TD 114-35 TL5 EII	8711500 911582	0.26	12	40.8x20.8x7.6	0.0065	3.4	8711500 911599	911582 30
HF-R TD 214-35 TL5 EII	8711500 911629	0.29	12	40.8x20.8x7.6	0.0065	3.8	8711500 911636	911629 30
HF-R TD 149 TL5 EII	8711500 908889	0.26	12	40.8x20.8x7.6	0.0065	3.4	8711500 908896	908889 30
HF-R TD 249 TL5 EII	8711500 909596	0.31	12	40.8x20.8x7.6	0.0065	4.0	8711500 909602	909596 30
HF-R TD 154 TL5 EII	8711500 909619	0.27	12	40.8x20.8x7.6	0.0065	3.5	8711500 909626	909619 30
HF-R TD 254 TL5 EII	8711500 909633	0.33	12	40.8x20.8x7.6	0.0065	4.2	8711500 909640	909633 30
HF-R TD 180 TL5/PL-L EII	8711500 909657	0.29	12	40.8x20.8x7.6	0.0065	3.7	8711500 909664	909657 30
HF-R TD 280 TL5/PL-L EII	8711500 910677	0.42	12	47.6x20.6x7.6	0.0075	5.3	8711500 910691	910677 30

Ordering and packaging data

Ballast	1 Piece		Bulk packaging					
	EAN code	Weight	Qty	Dimensions lxwxh	Volume	Weight Gross	EAN code	EOC
		kg	pcs	cm	m³	kg		
HF-R TD 124 TL5 EII								
HF-R TD 224 TL5 EII								
HF-R TD 139 TL5 EII								
HF-R TD 239 TL5 EII								

Under development, Introduction Q4 2007

Ordering and packaging data

Ballast	1 Piece		Bulk packaging					
	EAN code	Weight	Qty	Dimensions lxwxh	Volume	Weight Gross	EAN code	EOC
		kg	pcs	cm	m³	kg		
HF-R TD 314 TL5 EII								
HF-R TD 414 TL5 EII								
HF-R TD 324 TL5 EII								
HF-R TD 424 TL5 EII								

Under development, Introduction Q3 2007

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Data subject to change